

## CLAIMS

What is claimed is:

1. An amplifier comprises:

5 a transistor having a gate, a drain, and a source, wherein the source of the transistor is operably coupled to a voltage node;

a current source operably coupled to provide a current to the drain of the transistor;

10 a Metal Oxide Semiconductor (MOS) capacitor having a gate, a drain, a source, and a well, wherein the drain, the well, and the source of the MOS capacitor are coupled together to form a first plate of the MOS capacitor and the gate of the MOS capacitor provides a second plate of the MOS capacitor, wherein the second plate of the MOS capacitor is operably coupled to the gate of the transistor, wherein the drain of the  
15 transistor provides an output for the amplifier and the gate of the transistor provides an input of the amplifier; and

a level shifting module operably coupled to the first plate of the MOS capacitor such that the level shifting module shifts a gate-source voltage of the MOS capacitor to reduce  
20 variances of capacitance of the MOS capacitor such that bandwidth of the amplifier is limited and the amplifier is stable.

2. The amplifier of claim 1, wherein the level shifting module comprises:

25 a first transistor having a gate, a drain, and a source, wherein the gate of the first transistor is operably coupled to the drain of the transistor and the drain of the first transistor is operably coupled to a supply voltage; and

a current sink operably coupled to sink current from the source of the first transistor,  
30 wherein the source of the first transistor is operably coupled to the drain of the MOS capacitor.

3. The amplifier of claim 1, wherein the level shifting module comprises:

5 a first transistor having a gate, a drain, and a source, wherein the gate of the first transistor is operably coupled to the drain of the transistor and the drain of the first transistor is operably coupled to a ground; and

10 a current source operably coupled to source current to the source of the first transistor, wherein the source of the first transistor is operably coupled to the drain of the MOS capacitor.

4. The amplifier of claim 1, wherein the voltage node comprises at least one of a supply voltage and a ground.

5. An operational amplifier comprises:

input stage operably coupled to produce an output signal from a positive input signal and a negative input signal; and

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an amplifier that includes:

a transistor having a gate, a drain, and a source, wherein the source of the transistor is operably coupled to a voltage node;

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a current source operably coupled to provide a current to the drain of the transistor;

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a Metal Oxide Semiconductor (MOS) capacitor having a gate, a drain, a source, and a well, wherein the drain, the well, and the source of the MOS capacitor are coupled together to form a first plate of the MOS capacitor and the gate of the MOS capacitor provides a second plate of the MOS capacitor, wherein the second plate of the MOS capacitor is operably coupled to the gate of the transistor, wherein the drain of the transistor provides an output for the amplifier and the gate of the transistor provides an input of the amplifier; and

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a level shifting module operably coupled to the first plate of the MOS capacitor such that the level shifting module shifts a gate-source voltage of the MOS capacitor to reduce variances of capacitance of the MOS capacitor such that bandwidth of the amplifier is limited and the amplifier is stable.

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6. The operational amplifier of claim 5, wherein the level shifting module comprises:

a first transistor having a gate, a drain, and a source, wherein the gate of the first transistor is operably coupled to the drain of the transistor and the drain of the first transistor is operably coupled to a supply voltage; and

- 5 a current sink operably coupled to sink current from the source of the first transistor, wherein the source of the first transistor is operably coupled to the drain of the MOS capacitor.

7. The operational amplifier of claim 5, wherein the level shifting module  
10 comprises:

a first transistor having a gate, a drain, and a source, wherein the gate of the first transistor is operably coupled to the drain of the transistor and the drain of the first transistor is operably coupled to a ground; and

- 15 a current source operably coupled to source current to the source of the first transistor, wherein the source of the first transistor is operably coupled to the drain of the MOS capacitor.

- 20 8. The operational amplifier of claim 5, wherein the voltage node comprises at least one of a supply voltage and a ground.